

REMARKS

Claims 1-13 are all the claims pending in the application. By this amendment, the specification is amended to overcome a minor typographical error. It is submitted that this amendment does not add new matter. Applicant respectfully requests withdrawal of the rejection, and allowance of the claims.

I. Formalities, Objections

Applicant thanks the Examiner for acknowledging foreign priority based on Japanese Application No. 2000-205739, filed July 6, 2000. Additionally, the Examiner objects to the drawings due to an alleged informality. As shown in the foregoing amendments, Applicant has amended the specification to correct a minor typographical error and thus overcome the Examiner's objections. Therefore, Applicant respectfully requests withdrawal of the objection to the drawings.

In response to the Examiner's objection to claim 1, Applicant respectfully submits that the article "the" is necessary before the recited "at least one ordinary mode..." at line 11 of claim 1 to properly conform with the antecedent basis requirements of 35 U.S.C. § 112, 2nd paragraph, and to make the claims definite, based on the previous recitation of "at least one ordinary mode" at line 9 of claim 1. Thus, Applicant respectfully requests withdrawal of the objection to claim 1.

II. Allowable subject matter

The Examiner indicates that claims 3 and 13 contain allowable subject matter, and would be allowed if rewritten in independent form to include the limitations of their base claims and all

intervening claims. Applicant thanks the Examiner for the indication of allowable subject matter. However, Applicant respectfully declines to write the claims in independent form at this time, because Applicant believes that claims 1, 2 and 4-12 are also allowable, as discussed in greater detail below.

III. Claims 1, 2 and 4-12 would not have been obvious

Claims 1, 5 and 6 stand rejected under 35 U.S.C. § 103(a) due to alleged obviousness over Hirose et al. (U.S. Patent No. 6,018,140, hereafter “Hirose”) in view of Sakai et al. (U.S. Patent No. 5,682,576, hereafter “Sakai”) and claim 2 stands rejected under §103 over Hirose and Sakai in view of Kurotaka et al. (U.S. Patent No. 6,243,559 B1, hereafter “Kurotaka”). Further, claim 4 stands rejected under §103 over Hirose in view of Imaeda (U.S. Patent No. 5,093,689), claims 7-9 stand rejected under §103 over Hirose in view of Kurotaka and Sakai, and claim 10 stands rejected under §103 over Hirose in view of Suzuki et al. (U.S. Patent No. 5,994,671, hereafter “Suzuki”). Also, claim 11 stands rejected over Hirose in view of Nagumo et al. (U.S. Patent No. 5,128,709, hereafter “Nagumo”) and claim 12 stands rejected under §103 over Hirose in view of Sakai, Imaeda and Kurotaka.

Applicant respectfully submits that the Examiner’s proposed combinations of references fail to disclose or suggest all of the claimed combinations of features, as required for a prima facie obviousness rejection. Therefore, Applicant respectfully requests withdrawal of the rejection, and allowance of the claims.

The present invention relates to an image forming device. As illustrated in application Figure 2, a control section 102 includes a temperature sensor 104 that is attached to a heating drum 36. The temperature sensor outputs the temperature of the heating drum 36 to a controller 108, which compares the temperature to a prescribed temperature. The controller sends a control signal to a heater driver 106 that supplies power to a heater 100 based on the control signal. The control period of the control signal is varied depending on whether the device is in a printing mode at control period T1, or an ordinary mode at control period T0. The ordinary mode can further include a standby mode at control period T2 and a pre-heating mode at control period T3. To reduce flicker while maintaining print quality in various non-limiting, exemplary embodiments, $T1 > 0$, and at least one of T2 or T3 is greater than T1.

A. Claims 1, 5 and 6 would not have been obvious

Hirose discloses an image forming apparatus. As illustrated in Figure 13 of Hirose, an image is formed on a recording material in a fixing unit 11 through the use of a heat roller 12, connected to a temperature detecting unit 15 and a control unit 16. Hirose also discloses operation in a printing mode and a standby mode at column 5. However, as acknowledged by the Examiner, Hirose does not disclose that a period is altered in accordance with the control modes, or that a control period of the printing mode is less than a control period of the standby mode. Further, the Examiner also acknowledges that Hirose does not disclose that the control device alters a control duty ratio in response to a difference between the current temperature of the heating drum and the predetermined temperature.

Sakai discloses a fixing device. At column 5 and 6, Sakai discloses that the on-time of the heater can be increased or decreased to maintain the surface temperature at a target temperature. Sakai discloses performing this variation during the printing period. However, Sakai does not disclose a standby mode, and thus, does not disclose that the period is altered in accordance with the control modes. Rather, Sakai alters the period in accordance with the target temperature. Further, Applicant respectfully submits that Sakai does not disclose that the control period during printing mode is less than the control period during non-printing mode.

Applicant respectfully submits that the Examiner's proposed combination fails to disclose all of the claimed combinations of features. For example, but not by way of limitation, Applicant respectfully submits that the proposed combination fails to disclose altering a control period in accordance with control modes and that $T1 < T0$, as recited in independent claim 1.

Additionally, Applicant respectfully submits that the Examiner's motivation for the combination constitutes impermissible hindsight reconstruction. While the Examiner asserts that the motivation is to prevent flickering, neither reference discloses solving the flickering problem. Therefore, the only motivation for the Examiner's proposed combination and modification could have been derived from the present application, as neither of the references discloses or suggests control periods that are altered based on the control mode. Further, Applicant notes that in order to be a proper motivation, the references must provide the motivation, and the Examiner cannot substitute his own motivation. Thus, Applicant respectfully submits that because this the proposed modification is improper and should be withdrawn.

Dependent claims 5 and 6 depend from independent claim 1. Applicant respectfully submits that those dependent claims are allowable for at least the same reasons as discussed above with respect to independent claim 1. Additionally, Applicant respectfully submits that the proposed combination of references fails to disclose that control period of the printing mode is applied during the time from when the device is started until the time when the device has reached a predetermined temperature, as recited in claim 6. Applicant respectfully submits that Hirose fails to disclose this feature, and the combination of Sakai into Hirose fails to cure that deficiency. Applicant submits that Sakai only discloses activity at the time when printing is started, but does not disclose or suggest the control period during the time when the power source is turned on.

Therefore, Applicant respectfully requests withdrawal of the rejection under §103, and allowance of the claims.

B. Claim 2 would not have been obvious

Dependent claim 2 depends from independent claim 1. Applicant respectfully submits that dependent claim 2 is allowable for at least the same reasons as discussed above with respect to independent claim 1, and at least the additional reasons discussed below.

Kurotaka discloses a belt fixing device. At column 14, lines 42-48, Kurotaka discloses switching off the heater in the stand-by condition in order to save energy. Further, Kurotaka discloses at column 14, lines 64-67 that a temperature control unit controls the heater to maintain the surface of the fixing belt at a predetermined temperature.

As acknowledged by the Examiner, Hirose fails to disclose or suggest the ordinary mode includes a standby mode that maintains temperature of the heating drum at the predetermined temperature such that image-formation can be initiated promptly, and a pre-heating mode that reduces power consumption of the heating drum while keeping the heating drum in a state such that image-formation can be initiated in a short time. As also acknowledged by the Examiner, Hirose fails to disclose that if the period of on/off control of the printing mode is $T1$, a period of on/off control of the standby mode is $T2$ and a period of on/off control of the pre-heating mode is $T3$, then at least one of the following relationships: $T1 < T2$ and $T1 < T3$ is satisfied.

The Examiner asserts that the combination of Kurotaka and Hirose overcomes the above-noted deficiencies of Hirose with respect to claim 2. However, Applicant respectfully submits that the Examiner's proposed combination of Kurotaka and Sakai into Hirose is improper, because the references teach away from each other. While Kurotaka clearly discloses turning off the heating element to save energy and when the device is not in use, which cools the heating roller, Sakai teaches just the opposite: maintaining the temperature of the fixing roller at a target temperature. Thus, Applicant respectfully submits that Kurotaka and Sakai teach away from each other, and cannot be properly combined. Further, because Kurotaka is turned off during the standby mode, there is no periodicity to the operation of Kurotaka in that mode (i.e., a period of 0 results). Applicant respectfully submits that if the Examiner is characterizing this period as the claimed pre-heating control period, then the relationship $T1 < T3$ is not satisfied.

Additionally, Applicant respectfully submits that the Examiner has failed to show how the proposed combination of references discloses or suggests $T1 < T2$, as recited in claim 2. As

noted above, Sakai does not disclose the control period during standby mode is greater than the control period during printing mode. While Sakai does disclose maintaining a predetermined temperature, Sakai does not disclose a separate mode for standby and printing periods. Further, as noted above, Applicant respectfully submits that there is no motivation to modify the proposed combination of references to disclose or suggest the claimed combination of features, in the absence of the hindsight of the present application.

Therefore, Applicant respectfully requests withdrawal of the rejection under §103, and allowance of claim 2.

C. Claim 4 would not have been obvious

Dependent claim 4 depends from independent claim 1. Applicant respectfully submits that dependent claim 4 is allowable for at least the same reasons as discussed above with respect to independent claim 1. Therefore, Applicant respectfully requests withdrawal of the rejection under §103, and allowance of claim 4.

D. Claims 7-9 would not have been obvious

Dependent claims 7-9 depend from independent claim 1. Applicant respectfully submits that dependent claims 7-9 are allowable for at least the same reasons as discussed above with respect to independent claim 1, and at least the additional reasons discussed below.

Applicant respectfully submits that the Examiner's proposed combination of references fails to disclose or suggest all of the claimed combinations of features recited in claim 8. For example, but not by way of limitation, Applicant respectfully submits that the Examiner's

proposed combination of references fails to disclose or suggest that the pre-heating mode is selected if the standby mode is selected and no image-formation has been performed for a predetermined time period, as recited in claim 8. Applicant notes that the Examiner has asserted that at column 5, lines 39-48, Sakai discloses that the heating mode is selected if no image formation is performed for a predetermined amount of time. However, Applicant respectfully submits that the Examiner has apparently mischaracterized Sakai. At column 5, lines 39-48, Applicant respectfully submits that Sakai actually discloses that when a prescribed temperature is exceeded, the heater is turned off, followed by turning on the heater once the temperature of the roller has fallen below the prescribed temperature. Applicant respectfully submits that Sakai does not disclose a pre-heating mode in which the temperature is maintained below the prescribed temperature. In fact, Sakai appears to teach exactly the opposite: once the temperature falls below the prescribed level, the heater is turned on.

Therefore, Applicant respectfully requests withdrawal of the rejection under §103, and allowance of the claims.

E. Claim 10 would not have been obvious

Dependent claim 10 depends from independent claim 1. Applicant respectfully submits that dependent claim 10 is allowable for at least the same reasons as discussed above with respect to independent claim 1 and at least the additional reasons discussed below.

Suzuki discloses an image heating apparatus. At column 2, lines 17-25, Suzuki discloses use of phase control at the roller to more accurately control temperature at the roller. However,

Suzuki does not disclose a temperature control signal at the image forming device, having a phase difference with respect to a temperature control signal at the heating drum.

Applicant respectfully submits that the Examiner's proposed combination of Suzuki and Hirose fails to disclose that temperature control signal at the heating drum and another temperature control signal having a different phase and located at the image forming device, as recited in claim 10. As admitted by the Examiner, Hirose fails to disclose another temperature control signal at the image forming device. Further, the combination of Suzuki and Hirose also fails to disclose or suggest this claimed feature.

Thus, Applicant respectfully submits that the references lack any teaching or suggestion that would motivate one of ordinary skill in the art to combine and/or modify the cited references in order to produce another temperature control signal at the image forming device, as recited in claim 11. Further, Applicant respectfully submits that the only available source of motivation is the present application. Applicant therefore submits that impermissible hindsight reconstruction, in view of the invention as claimed in the present application, has been applied to combine and modify the references.

Therefore, Applicant respectfully requests withdrawal of the rejection under §103, and allowance of claim 10.

F. Claim 11 would not have been obvious

Dependent claim 11 depends from independent claim 1. Applicant respectfully submits that dependent claim 11 is allowable for at least the same reasons as discussed above with

respect to independent claim 1. Therefore, Applicant respectfully requests withdrawal of the rejection under §103, and allowance of claim 11.

G. Claim 12 would not have been obvious

Applicant respectfully submits that the Examiner's proposed combination fails to disclose all of the claimed combinations of features. As noted above with respect to claim 1, Applicant respectfully submits that the proposed combination fails to disclose altering a control period in accordance with control modes, as recited in independent claim 12, and that the Examiner's motivation constitutes impermissible hindsight reconstruction. Also, Applicant respectfully submits that as noted above with respect to claim 2, the Examiner's proposed combination of Kurotaka and Sakai into Hirose is improper, because the references teach away from each other, because Sakai teaches the opposite of Kurotaka: maintaining the temperature of the fixing roller at a target temperature, as opposed to turning off the heater. Thus, Applicant respectfully submits that Kurotaka and Sakai teach away from each other, and cannot be properly combined to render obvious the recitation of claim 12 as asserted by the Examiner.

Also, Applicant respectfully submits that the Examiner's proposed combination of references fails to disclose one of T2 and T3 is greater than T1, as recited in independent claim 12. The Examiner asserts that Sakai discloses that $T2=T1$ (i.e., T2 is not greater than T1). However, the Examiner also asserts that T3 is greater than or equal to T1. However, Applicant notes that Sakai does not disclose the control period during the standby period and only discloses

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maintaining a constant temperature, and that Kurotaka discloses a period of 0 (i.e., turning off the heater, so that there is no repeated on/off cycle) when the heater is not operating (i.e., $T_3=0$).

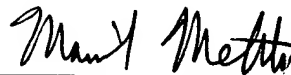
Therefore, Applicant respectfully requests withdrawal of the §103 rejection, and allowance of the claims.

IV. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 12, 3rd full paragraph:

In the image-forming device 150, a photosensitive thermal recording material [170]174 is drawn out from a magazine 160 and exposed at an exposure section 168 to form a latent image. The latent image is developed at a developing section 170, and the resulting image is fixed at a fixing section 172.